

Chromosome Morphology in *Kniphofia*.

By

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ABSTRACT.

A number of species and varieties of the genus *Kniphofia* (Liliaceae) were studied cytologically. The somatic chromosome number is $2n = 12$ in all the species. This is also true in *Notosceptrum natalense* Baker.

MATERIAL AND METHODS.

The material studied was collected in the veld and cultivated on the Prinshof Experiment Station in Pretoria. The collectors' numbers listed in Table I also refer to the specimens filed with the National Herbarium, Pretoria. Root-tips were fixed in Randolph's (1935) fluid, dehydrated using normal butyl alcohol and embedded in a paraffin-beeswax-rubber mixture. Sections were stained in Stockwell's (1934) fluid. Inflorescences were fixed in 3: 1 absolute ethyl alcohol, propionic acid. Anthers were squashed in propionic-carmin after the method outlined by Swaminathan, Magoon and Mehra (1954). Karyotypes were computed with the aid of a camera lucida, using the average length of chromosomes from five different metaphase plates. The magnification is X2,500.

CHROMOSOME NUMBER.

The genus was previously studied by Webber (1932), Moffet (1932) and Janaki-Ammal (1950), demonstrating $n = 6$. Polyploidy appears to be absent except in a triploid specimen of *K. snowdenii* from Uganda (Janaki-Ammal, 1950). The species studied are listed in Table I. Polyploid cells were observed in otherwise normal diploid roots of *K. sp.* (Codd 6955). This is also true among pollen mother cells of this species. In these cells quadrivalents, together with a varying number of bivalent and univalents, were observed. Similar observations were made by Moffet (1932) in polyploid cells of *K. triangularis* (= *K. nelsonii*). In the diploid pollen mother cells, chromosome pairing and movement are normal.

CHROMOSOME MORPHOLOGY.

The haploid chromosome set of $n = 6$ in *Kniphofia* may be subdivided into three distinct groups. Two chromosomes are significantly longer than the rest. Both are characterized by secondary constrictions. They differ from each other in the position of the centromere.

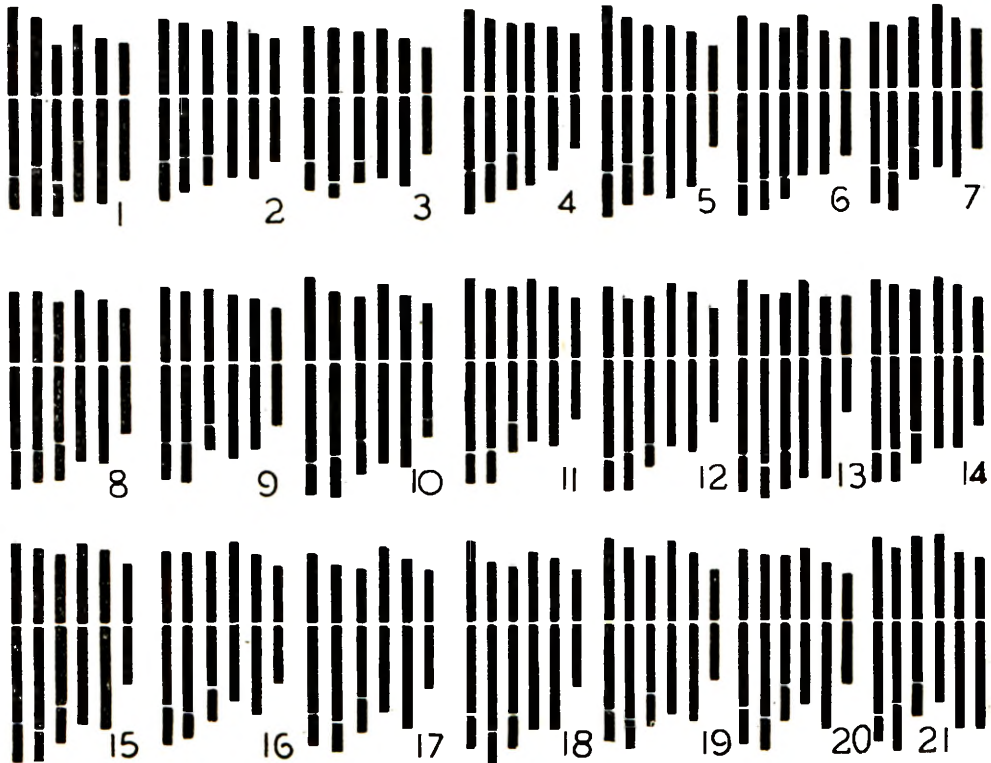
Three chromosomes are of medium length. One of these is characterized by a secondary constriction, whereas the other two differ from each other in the position of the centromere. The sixth chromosome is short with a submedian centromere.

The material of *Notosceptrum* resembles *Kniphofia* in karyotype except for the sixth chromosome which is also of medium length. The karyotype varies very little from one species of *Kniphofia* to the other.

During meiotic telophase six nucleoli are always produced. This indicates the presence of six chromosomes with nucleoli organizing regions (Pathak, 1940, Gates, 1942, de Wet, 1953). These are evidently the six chromosomes (three chromosome pairs) with secondary constrictions.

TABLE 1.—*Chromosome numbers in Kniphofia and Notosceptrum.*

Name.	Origin.	Collector.	2n	Fig.
<i>Kniphofia</i> —				
<i>K. baurii</i> Bak.....	Newcastle.....	Codd 6509.....	12	1
<i>K. bachmanii</i> Bak.....	S.W. Cape.....	van Breda s.n.....	12	2
<i>K. caulescens</i> Bak.....	Nottingham Rd.....	Smuts s.n.....	12	3
<i>K. ensifolia</i> Bak.....	Linokana.....	Bruce 231.....	12	4
(= <i>K. rivularis</i> Berger).....	Pretoria.....	Codd 4777.....	12	
<i>K. ensifolia</i> Bak. var. <i>albiflora</i> E. A. Bruce.....	Kransberg.....	Bruce 56.....	12	5
<i>K. ichopensis</i> Schinz.....	Tabamhlope.....	Killick s.n.....	12	6
<i>K. macowanii</i> Bak.....	Wuthering Heights..	Codd 8530.....	12	7
<i>K. multiflora</i> Bak.....	Wonderhoogte.....	Codd s.n.....	12	8
<i>K. obtusiloba</i> Diels ex Berger.....	Slaaihoek.....	Codd 8274.....	12	9
<i>K. porphyrantha</i> Bak.....	Belfast.....	Codd 7592.....	12	10
(= <i>K. conrathii</i> Bak.).....	Pretoria.....	Codd 4776.....	12	
<i>K. sp.</i>	Cathedral Peak.....	Killick 1466.....	12	11
<i>K. praecox</i> Bak.....	E. Cape.....	Bruce 522.....	12	12
<i>K. rhodesiana</i> Rendle.....	Mariepiskop.....	Codd 7922.....	12	13
<i>K. rooperi</i> (Moore) Lem.....	Sunwich Port.....	Codd 6793.....	12	14
<i>K. rufa</i> Bak.....	Cathedral Peak.....	Killick 1467.....	12	15
<i>K. rigidifolia</i> E. A. Bruce.....	Machadodorp.....	Codd 8066.....	12	16
<i>K. splendida</i> E. A. Bruce.....	Magoebaskloof.....	Groeneveld s.n.....	12	17
<i>K. tysonii</i> Bak.....	Rosetta.....	Codd 8520.....	12	18
<i>K. tuckii</i> Bak.....	Fauresmith.....	Henrici s.n.....	12	19
<i>K. uvaria</i> (L.) Hook.....	Stormsvlei.....	van Breda s.n.....	12	20
<i>Notosceptrum</i> —				
<i>N. natalense</i> Bak.....	Potchefstroom.....	de Wet 392.....	12	21



DISCUSSION.

Polyploidy is absent in the South African species of *Kniphofia*. The presence of polyploid cells in otherwise normal diploid species could give rise to viable pollen with variable chromosome numbers. These could produce individuals such as the triploid specimen of *K. snowdenii* from Uganda. Although more than 50 collections of various species of *Kniphofia* from all over the Union were studied no abnormal chromosome numbers were encountered.

Species evolution in *Kniphofia* must have taken place through point mutations and small chromosomal aberrations. This perhaps is also the reason why many collections are difficult to classify with certainty into specific units. The specific characters could become established in the newly evolved individuals through isolating mechanisms such as flowering time and geographical distribution. When the species are planted together they hybridize freely.

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